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China's Coal Industry—Impact of Reform

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A Research Paper

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December 1986

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A Research Paper

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China's Coal Industry— Impact of Reform [redacted] 25X1

Summary

Information available as of 1 December 1986 was used in this report.

China produced a record 850 million metric tons of coal in 1985, supplanting the United States as the world's largest producer. Because this high output yielded a large surplus, we expect production in 1986 to stabilize while China draws down enormous inventories.

We believe the rapid growth in China's coal production—28 percent between 1982 and 1985—has resulted from reforms in price, ownership, and wages. In our judgment, Beijing undertook its most important reform in 1981 when it began encouraging coal production outside the state plan by allowing coal to be sold at market prices. In this way, Beijing encouraged efficiency and introduced indirect price reform without the inflationary shock to the economy that an overall price increase would deliver. Today as much as half of China's coal sells at prices three or four times higher than the state price.

China has also encouraged surplus rural labor to set up small-scale coal mines that have helped provide energy to rural areas and to industries outside the state mine allocation system and where transport is difficult. The Chinese press has reported that the number of small-scale mines tripled between 1981 and 1985 and has now stabilized at over 60,000. We believe this sector will probably not grow much more because the local markets have become saturated, Beijing's administrative controls have tightened, and easily mined reserves have become depleted.

We believe China is capable of meeting its goal of producing 1.2 billion tons of coal annually by the year 2000. Most of this growth will be achieved by further mechanizing existing sites and opening new large mines. Higher productivity has already been achieved through the introduction of piece wages and bonuses, and we expect additional gains from mechanization.

Nevertheless, [redacted] China may need even more coal at the turn of the century to fuel its economy. Because it has enormous coal reserves, we believe that China could produce more but that financial and transport constraints will limit the pace of the coal sector's growth. Beijing has sought foreign loans, investment, and assistance to expand and modernize its larger coal mines, but falling international coal prices have reduced Beijing's prospects of obtaining foreign investment. 25X1

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Insufficient transportation and generator capacity are at the heart of energy shortages that idle up to one-fifth of Chinese industry, and we expect them to continue. Beijing is attempting to improve the transport of coal by upgrading rail lines and ports, while building more electric power plants adjacent to mines. However, we anticipate that coal transport bottlenecks will persist because the rapid pace of nationwide economic development will place additional demands on China's transport system.

China's drive to mechanize mining and improve coal transportation will open markets for foreign equipment and technology. While prospects for US sales are good, we expect strong competition from such countries as Japan, West Germany, France, and Italy for mining and hauling equipment, processing machinery, coal gasification technology, and other coal-related needs. At the same time, we expect Beijing to use its improved economic ties—especially barter trade arrangements—to Eastern Europe and the Soviet Union to obtain mining equipment and assistance at little cost in foreign exchange.

To bolster foreign exchange earnings, China has announced plans to quadruple its coal exports to 30 million tons annually in 1990—placing it in direct competition with the United States and Australia, primarily in the East Asian market—and we estimate that exports could reach 50 million tons by 2000. We expect that Beijing will capture new markets—especially in Japan—by offering significant discounts and naming coal a priority export, much the way it did to expand its oil sales abroad. Port and rail expansion is under way to support increased coal exports.

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Contents

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Figure 1
Coal Industry

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25X1

China's Coal Industry—Impact of Reform

25X1

Rapid Growth

China produced a record 850 million tons of coal in 1985, supplanting the United States as the world's largest producer (see table 1 and figure 2). We believe the rapid growth—28 percent since 1982—has resulted from reforms in price, ownership, and wages. These reforms have provided strong incentives to producers by easing central control over the industry and introducing market forces. Because China's transport sector has been unable to cope with this increase, there will be little or no growth in coal production in 1986 while enormous stockpiles—reported by the Chinese press to have grown 38 percent in 1985 to 54 million tons—are being drawn down.

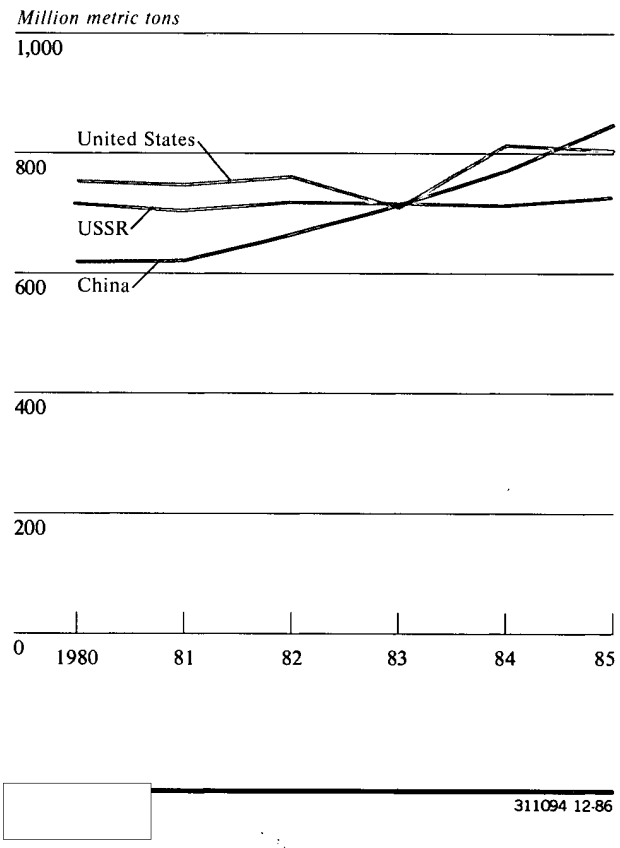
We believe the success of these reforms in China's coal industry is critical because coal provides 70 percent of the country's energy supply, among the highest of any major country (see table 2). It fuels most of China's power plants as well as cooking and heating for many Chinese (see figure 3).

Reforms in the Coal Industry

In 1981 China instituted three major reforms of the coal industry. It began allowing coal produced outside the state plan to be sold at market prices. It encouraged peasants to open their own mines and transferred many state mines to local control. And the Chinese began using piece wages to improve productivity in both state and local mines. These reforms have resulted in several significant changes in China's coal industry:

- Over 60,000 small-scale mines operated by individuals and collectives produce 30 percent of China's coal.
- Another 20 percent of China's coal is produced at locally owned mines, many of which were previously controlled by the Ministry of Coal.
- As much as half of China's coal is sold at negotiated prices, often three or four times the state price.
- Piece wages and bonuses are widely used.

Figure 2
US, USSR, and China Coal Production, 1980-85



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Ownership Reforms—The Debate Over Small-Scale Mines. China's proliferation of small-scale coal mines has been quite controversial, often pitting the Coal Ministry against the small-scale miners. But press reporting indicates that outside the Coal Ministry support for the development of small-scale mines has

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Table 1
China: Raw Coal Output

Million metric tons

	State Mines	Local Mines	Small-Scale Mines	Total
1980	344	162	114	620
1981	335	160	127	622
1982	350	170	146	666
1983	363	182	170	715
1984	395	168	226	789
1985	416	179	255	850

Table 2
Share of Solid Fuels Consumption in Selected Countries

Percent

Poland	81
China	70
India	44
South Korea	36
United Kingdom	34
West Germany	32
USSR	28
United States	23
Japan	18

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Figure 3. Coal briquets are still widely used in China for heating and cooking.

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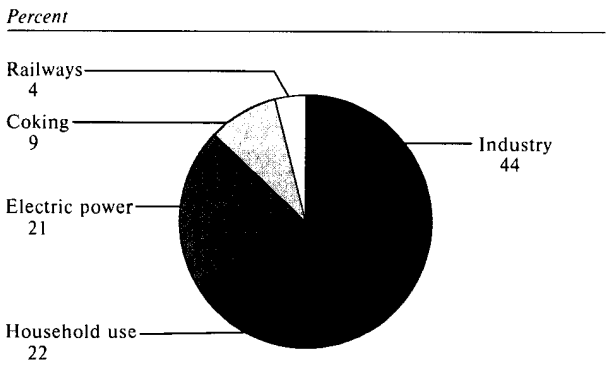
Figure 4
China: Coal Consumption, 1983



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been widespread, led by Premier Zhao Ziyang. Supporters promote development of small mines because they:

- Provide energy to rural areas and industries outside the state mine allocation system and where transportation is difficult. They allow Beijing to set up rural industries in regions with surplus labor created by the agricultural reforms.
- Economically work small or shallow deposits, which could not be effectively done on a large scale. This is particularly true for areas outside North China's coal region that have only small pockets of coal reserves.
- Increase the recovery rate for deposits abandoned by larger mines.

The Coal Ministry, on the other hand, never favored these mines, preferring that all production remain under its control. Several Coal Ministry officials expressed their contempt for the small-scale mines to a visiting US official in May, criticizing them as wasteful and dangerous. Small mines have also been

Ownership Reforms: China's Three Types of Coal Mines

State Mines. *The Ministry of Coal claims it directly operates 600 large mines, which produce about half of China's coal. Increased mechanization more than offset a 5-percent cut in the work force in 1985, resulting in an increase in state mine output of 5.3 percent. The Ministry of Coal sells most coal from these mines according to the state distribution plan at fixed state prices. In addition, each mine may sell above-quota production at market prices and retain the profits, according to the Coal Ministry.* 25X1

Local Mines. *Approximately 20,000 mines are run by provincial, county, or special zone authorities. Some are former state mines that have been transferred to local control but continue to produce coal for allocation under the state plan at state prices. According to the Coal Ministry, almost half the output of local mines (70-80 million tons) was distributed this way last year and the remainder was sold at market prices.* 25X1 25X1

Small-Scale Mines. *Over 60,000 small-scale mines have been established throughout China. Of their approximately 5 million employees, many were farmers displaced by earlier reforms in agriculture.* 25X1 25X1

Many of these mines had been part of the commune system and are now run as township enterprises. However, the greatest growth has been in the development of small mines operated by individuals or small groups. These have mushroomed since Beijing encouraged collectives and individuals to mine coal for sale at market prices in 1981 and again in 1983. The resulting "coal rush" tripled the number of small-scale mines and doubled their output between 1981 and 1985. All small-scale production is outside the state plan. 25X1 25X1

China's Coal Wars

The political fight over small-scale coal mines occasionally has led to apparently isolated but violent confrontations between state and small-scale miners. In February the Beijing Economic Management *journal provided an unusually revealing account of several such incidents. In one case in 1982, 100 peasants reportedly wrecked a state coal mine director's office because they had been refused permission to mine near the state mine. The article also reported that in early 1985 officials from another state mine blew up the entrances to eight small-scale mines adjoining their site after they were unable to convince the peasant miners to leave.*

criticized in the Chinese press for causing environmental damage, overlapping onto larger state mines, and being highly inefficient. In several cases, mine shafts and aboveground buildings were reported to be undermined because nearby small-scale mining operations had weakened the surrounding earth. The press also has reported several violent confrontations between state and small-scale mines (see the inset).

Nonetheless, the high-level support suggests that the coal reforms will continue, though they will be more carefully controlled to prevent the overlapping claims and environmental damage that the indiscriminate opening of some small-scale mines caused. To this end, the National People's Congress (NPC) passed a mining law in March 1986 to control the proliferation of small-scale mines.[1] This law, which took effect on 1 October, requires individuals and collectives to obtain a license, pay a resource exploitation tax, and reclaim affected land.

We believe that licensing and taxation of these mines and tightened credit for all rural industries, as well as saturation of the rural coal market, have stabilized the number of small-scale mines. According to the *China Daily* newspaper, small-scale coal production

[1] In a highly unusual move, the NPC Standing Committee sent the original draft of the law back to the State Council in the fall of 1985, apparently because it was regarded as being too restrictive of the small-scale mines.

Table 3
China: Official State Coal Prices

Per metric ton

Washed coking coal	50 yuan ($13) [a]
Anthracite	34 yuan ($9)
Bituminous (steam coal)	27 yuan ($7)
Lignite (brown coal)	19 yuan ($5)

[a] 3.8 yuan = $1.00

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in the first half of 1986 dropped 10 percent from the same period last year. Localized oversupplies of coal and the resulting lower prices may also have prompted some peasants to switch out of coal mining into other industries. We, nonetheless, expect small-scale miners to resist efforts to restrict their operations because these mines have been quite profitable, and demand—and therefore prices and profits—will continue strong because many new rural industries rely on small-scale coal mining.

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Price Reforms—Breaking Out of Fixed Prices. China has not raised its official coal prices since 1981 (see table 3), but the effective price of coal has risen dramatically because about half of production now sells outside the state plan at significantly higher market prices. a two-tiered system has evolved under which state-run and other large, established enterprises pay the traditional low prices for coal allocated by the state, but use the higher priced free market coal for production above official plans. New small enterprises, mainly the small rural industries, generally must buy all their coal at market prices.

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We believe China's leaders chose to use this dual-price structure to implement coal price reform gradually because they wanted to avoid the criticism that would probably have been generated by the inflationary shock of an across-the-board increase in coal prices. Many economists and senior leaders, arguing in the press that coal

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Coping With the Transportation Bottleneck

In our judgment, the most serious obstacle to increased coal consumption in China is transportation. China's long overburdened transport system has been unable to cope with the tremendous increases in coal production. We attribute China's chronic shortage of electricity—which idles one-fifth of its industrial capacity—to transport problems and the lack of generator capacity. Most of the huge stockpiles are at the state and local mines that rely on rail transport, and the Chinese press has reported that stockpiles are so large that many of these mines have slowed production this year. Indeed, total output through June reached only 403 million tons, nearly 2 percent less than the same period in 1985. Although part of the decline was caused by the lower output of small-scale mines, we anticipate that coal production at the state mines will grow little, if any, in 1986 as China attempts to draw down its huge surplus.

To improve the transport of coal, Beijing is upgrading rail lines and ports and building more electric power plants at coal mines with electricity transmission lines to power-consuming areas. These efforts will help, but we believe that coal transport shortages will persist as the rapid pace of economic development places additional pressures on the system. Coal makes up 40 percent of all rail freight, and in the heart of China's coal belt, Shanxi Province, it accounts for 90 percent. Because three rail lines between Shanxi and the coast are being improved, we believe Beijing will be able to reach its goal of shipping 200 million tons out of Shanxi annually by 1990, almost 60 percent more than now. New port facilities will enable China both to export more coal and to ship greater amounts to central and south China. 25X1

We believe that small-scale coal mine production will largely be unaffected by the transportation bottleneck because this coal primarily serves local—more accessible—markets. Most small-scale coal is transported privately by peasants, who have found the business lucrative. Beijing encouraged their efforts to provide local transportation in 1985 by increasing short-haul railroad freight rates. Private enterprises and individuals have bought vehicles ranging from trucks to carts, and, according to the Chinese press, these businesses account for nearly 80 percent of all highway freight on a ton-per-kilometer basis. Although many of these private companies transport small-scale coal, the State Planning Commission has also established the China Clean Coal Company, which uses information about nationwide supplies and demand to serve as a broker for the nonstate mines, buying their output and arranging transportation to customers willing to pay a premium for additional coal. 25X1 25X1

prices have been kept far too low as a subsidy to industry, favor a hike in official prices as well. They believe that higher coal prices would, in the long term, encourage higher coal output and more efficient consumption. They also have insisted that higher coal prices will encourage China's transport sector to give greater priority to moving coal instead of other goods, especially using private transport on China's highways. Nonetheless, according to the US Embassy in Beijing, a 1984 push by reformers in the leadership to hike official prices failed, in part because it would place an undue burden on most enterprises, which are not permitted to raise the prices on their products. At the same time, maintaining artificially low coal prices by subsidizing coal-consuming industries costs Beijing perhaps billions of yuan annually. 25X1

Although plentiful supplies have depressed market coal prices from their initial high levels, the growing use of free market coal nationwide has had some of the same effects as a price rise. In 1984 the Chinese press reported market prices for coal delivered outside North China's coal belt exceeded 150 yuan ($60) per ton; the price for a ton of market coal in 1986 runs about 100 yuan ($26) in Shanghai and Jiangsu Province. Most of this cost is for transportation. According

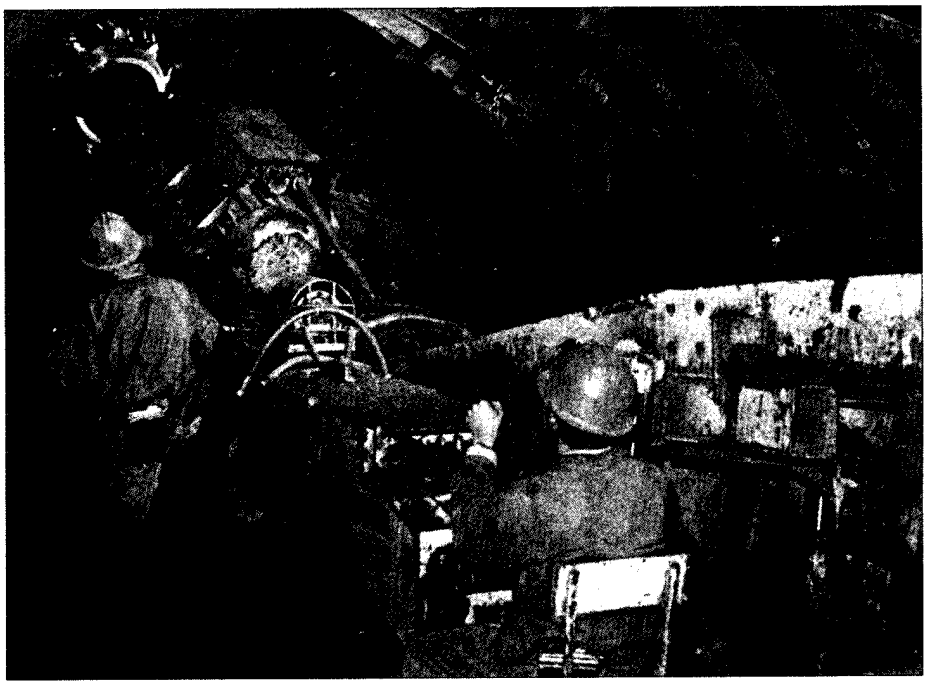

Figure 5. Mechanization is improving productivity at China's coal mines. 25X1

to the Coal Ministry, the Ministry of Railroads is obligated only to transport coal produced under the state plan; as a result, mines must negotiate transportation of above-quota coal, for which the railroad charges a premium.

Wage Reforms—Building Incentives. As in other industries, Beijing has tried to tie wages in the coal sector to output to improve productivity. Many of China's coal mines use piece wages or divide profits from extra production among the miners. One-third of wages for production workers at state mines are based on productivity, whereas before the reforms wages were based on attendance, seniority, and responsibility. *People's Daily* reported in mid-1984 that an "ironman" at one small-scale mine in Liaoning where earnings were exclusively piece wages earned—at 5 yuan per ton—800 yuan ($320) during his best month, about five times the average wage at these mines. Beijing has also issued large cash awards to reward productive units. For example, in December 1985 the Datong mining bureau in Shanxi Province received a cash prize of 1.8 million yuan ($580,000) for producing a record 30 million tons of coal that year.

Assessing the Coal Reforms

The coal reforms have increased supplies, encouraged efficiency, and improved productivity. We attribute most of the coal output growth in the 1980s to the reforms, particulary ownership and price reforms. While large mine production increased at an average annual rate of less than 4 percent in 1981-85—because of new mine openings and mechanization—small-scale output rose 17.5 percent yearly. Coal supplies have improved in many areas, especially outside North China's coal regions. In 1985 Sichuan Province produced a surplus for the first time, and even supplied coal to neighboring provinces. More than 60 million peasants have gone to work in rural industries, and many of these jobs were made possible by the new supplies of coal in rural areas. 25X1

We are less certain of the effect of wage reforms, but we believe higher wages and greater mechanization have boosted productivity. In July the Coal Ministry 25X1

Seeking Foreign Assistance and Technology

In recent years, China has sought foreign loans, investment, and assistance to expand and modernize its larger coal mines, but we believe that falling international coal prices have reduced Beijing's prospects of obtaining foreign investment. Several large joint ventures have been indefinitely postponed (see table 4). Occidental Petroleum's Pingshuo joint venture was delayed several years by financing problems related to the falling coal price, but in June 1985 Occidental signed the $650 million deal to produce 15 million tons a year beginning in 1988. Located in Shaanxi Province, it will be the world's largest open pit coal mine. Over half of Pingshuo's production will be exported, with Occidental receiving 4.5 million tons annually of washed coal as its share.

In spite of setbacks, we expect China to continue to seek foreign expertise, technology, and equipment to build new coal mones and upgrade older ones. Senior Chinese coal officials told the Secretary of Energy last spring that China needs US technology, including continuous extraction and coal gasification equipment. However, we believe that Chinese will buy coal equipment and technology from a variety of sources, with European countries, particularly West Germany, France, and Italy, well placed to pick up a significant share of the market. Because Beijing's foreign exchange shortage will limit its ability to pay for these goods, we expect China to offer coal in barter trade arrangements.

Beijing's interest in barter trade will probably lead to more acquisitions of equipment and assistance for China's coal industry from Eastern Europe and the Soviet Union. The Soviets are helping the Chinese build a large open pit coal mine and an adjoining power plant at Yiminhe in Inner Mongolia, the USSR's largest project in China, for which Beijing will pay barter goods. Poland also has increased its sales of mining equipment to China, and prospects are good for continued cooperation following the May 1986 visit to Poland by China's Minister of Coal.

reported that for the first time miners at the state mines produced an average of 1 ton per miner per day.

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Price reforms have, in our judgment, significantly, bolstered output especially in rural areas where the extra coal supplies have given additional impetus to rural industrial development outside the state plan. The higher prices of coal have encouraged its efficient use and conservation. For example, in 1985 Jiangsu Province reported in its press that it recovered enough coal dust and fragments to save 800,000 tons of coal.

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On the debit side, the growing use of coal throughout China creates an increasingly obvious need for pollution controls. According to the Chinese press, Beijing Municipality burned more than 20 million tons of coal last year; almost 23 tons of coal dust fell on each square kilometer, and the winter air was nearly unbreathable. While the press reports that the pollution rate was down 23 percent from 1980, the coal dust problem remains serious. Larger cities such as Beijing are switching to natural gas for household heating and cooking, but it will take years before this becomes widespread.

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The growth in small mines has also raised concerns about safety. *China Daily* reported in early December that more than 200 people had been killed in accidents at small-scale coal mines during the first half of 1986. The small-scale mines have frequently been criticized in the press for being particularly dangerous and subject to cave-ins. The Chinese have not indicated that they have had any major coal mine disasters in recent years, but they do not always report such incidents.

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Meeting Future Needs

Beijing plans to continue relying heavily on coal for its energy supply well into the next century, and we believe China is capable of meeting its target of producing 1.2 billion tons annually by the year 2000.

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Table 4: Postponed or Canceled Open Pit Coal Joint Ventures

Project	Location	Size	Partner	Status
Jining	Shandong	4 million tons annually	Royal Dutch Shell	Canceled [a]
Jungar	Inner Mongolia	25 million tons annually	Japanese consortium	Indefinitely postponed
Shenmu	Shaanxi Province	30 million tons annually	French and US firms showed interest	Postponed by China because of high costs

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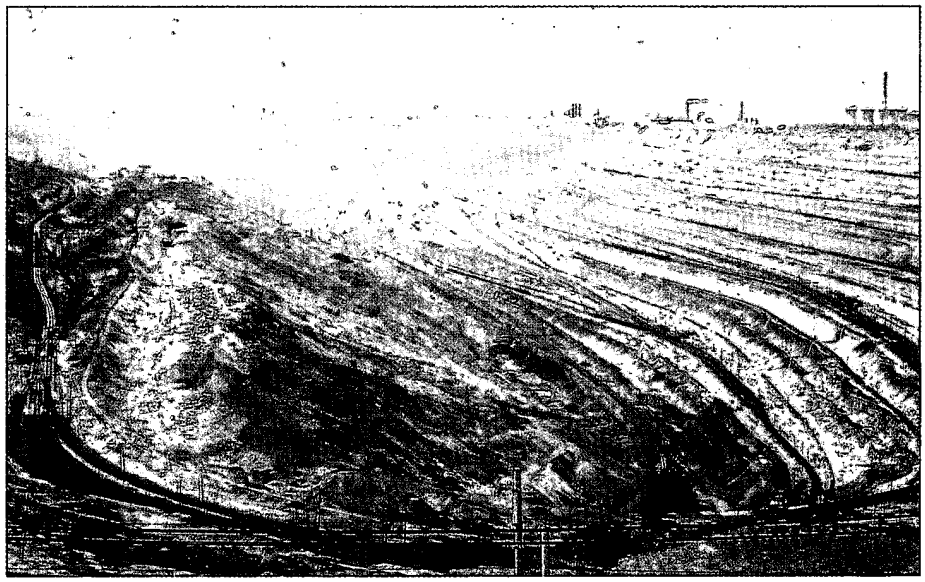
Figure 6. The Fushun open pit coal mine in Liaoning Province was begun in 1914, and it is currently China's largest open pit mine. It is 13.2 square kilometers and produces 3.3 million tons annually.



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China estimates its reserves at 781 billion tons, which would make them the world's largest. these abundant supplies are mostly good-quality coal, which can be mined at relatively low cost. We anticipate Beijing will achieve most of its growth by further mechanizing existing state and local sites and by opening new large mines.

We are less certain that small-scale mines will be able to increase their output. The spectacular growth in the output of such mines was essentially a one-time response to the reforms, and, therefore, we expect market saturation, tighter administrative controls, and depletion of easily mined reserves will limit further growth.

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However, even at the target level, Beijing's production in the year 2000 may be insufficient to fuel China's ambitious modernization program. China will need 1.2-1.8

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Table 5
China's Coal Exports, 1985

Metric tons

Total	**7.6** [a]
Japan	3.4
North Korea	2.0 [b]
South Korea	1.7 [b c]
Hong Kong	0.7

[a] As reported in Chinese statistics.
[b] Estimate.
[c] South Korea exports may not be included in Beijing's total exports.

billion tons of coal annually by then, suggesting that production will have to increase faster if economic growth continues to exceed the target rates.[2] We believe China could expand coal production beyond 1.2 billion tons annually by 2000, but Beijing would have to accomplish several costly tasks that make this goal unlikely:

- Heavily invest in new large coal mines, taking resources away from other industries.
- At least double state coal prices, which would promote more mine development, but would also significantly raise the expenses of many industrial enterprises.
- Build additional railways, highways, and vehicles, while giving coal transport priority over other goods.

Boosting Exports. Moreover, we anticipate that Beijing will try to export more coal to help pay for foreign technology and equipment (see the inset), even if it means holding back some domestic consumption, much as China has done with oil.[3] China's recently announced goal of quadrupling its coal exports to 30 million tons annually by 1990 will put it in direct competition with the United States and Australia in an already weak international energy market. We believe China will offer significant discounts to capture new markets, much the way it did to expand its oil exports. The World Bank is helping to finance several of the transport infrastructure improvements that will facilitate greater exports.

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Beijing has aggressively sought new markets for its coal throughout the world, including countries with which it has no diplomatic relations; South Korean businessmen have told the US Consulate in Hong Kong that Seoul bought approximately 1.7 million tons of China's coal last year. In August, Indonesia signed a $14 million deal to import 400,000 tons of Chinese coal in exchange for 100,000 tons of cement. In November 1985, China signed a five-year agreement to supply the Netherlands with 4 million tons of coal. Beijing recently sent a coal trade delegation to Western Europe to try to market its coal in countries beginning to boycott South African goods. China has yet to sell any coal to the United States.

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Nevertheless, China's coal exports will probably remain concentrated in East Asia, especially Japan, where we expect Beijing to be a strong competitor against other suppliers such as the United States and Australia because China has proximity and price advantages. On the basis of China's planned growth in output and transport infrastructure, we estimate that China could become an internationally significant exporter by the year 2000—exporting as much as 50 million tons worldwide annually—or 4 percent of China's forecast output.[4]

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[4] In contrast, in 1985 the United States exported 77 million tons, 10 percent of total production.

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